CHULITNA ELECTROMAGNETIC AND MAGNETIC AIRBORNE GEOPHYSICAL SURVEY DATA COMPILATION

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Geophysical Report 2020-2

2020
STATE OF ALASKA
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

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CHULITNA ELECTROMAGNETIC AND MAGNETIC AIRBORNE GEOPHYSICAL SURVEY DATA COMPILATION

L.E. Burns[1], G.R.C. Graham[1], J.D. Barefoot[1], Rebecca-Ellen Woods[1], Dighem, R.A. Pritchard[2], WGM, Inc., Stevens Exploration Management Corp., and Fugro Airborne Surveys Corp.

ABSTRACT

This Chulitna electromagnetic and magnetic airborne geophysical survey is located in interior Alaska in the Chulitna mining district, about 200 kilometers south of Fairbanks, Alaska and about 200 kilometers north of Anchorage, Alaska. Frequency domain electromagnetic and magnetic data were collected with the DIGHEM^{V} system in September 1996. A total of 2647.7 line kilometers were collected covering 943.5 square kilometers. Line spacing was 400 meters (m). Data were collected 30 m above the ground surface from a helicopter towed sensor platform ("bird") on a 30 m long line.

PURPOSE

This airborne geophysical survey is part of a program to acquire data on Alaska's most promising mineral belts and districts. The information acquired is aimed at catalyzing new private-sector exploration, discovery, and ultimate development and production. The purpose of the survey was to map the magnetic and conductive properties of the survey area. The survey area contains the Golden Zone, a historically producing mine and currently active gold exploration property. Mineral prospects in the survey area include Honolulu and Canyon Creek. Other gold and base-metal anomalies, altered zones, favorable lithologies, and structural zones are known to exist throughout the survey area.

SURVEY OVERVIEW DESCRIPTION

This document provides an overview of the survey and includes text and figures of select primary and derivative products of this survey. A table of digital data packages available for download is provided to assist users in data selection. For reference, a catalog of the available maps is presented in reduced resolution. Please consult the metadata, project report, and digital data packages for more information and data.

ACKNOWLEDGMENTS

Funding was provided by the Alaska State Legislature as part of the DGGS Airborne Geophysical/Geological Mineral Inventory (AGGMI) program.

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[1] Alaska Division of Geological & Geophysical Surveys, 3354 College Road, Fairbanks, Alaska 99709-3707

[2] Fugro Airborne Surveys Corp.

AVAILABLE DATA

Data Type	Provider	Description
ascii_data	contractor	ASCII format line data, other ASCII data
databases_geosoft	contractor	Geosoft format database of final line data, other Geosoft format databases
documents	contractor and DGGS	Project and field reports, survey background information, gridded data explanations, other documentation
grids_ermapper	contractor and DGGS	Geographically registered gridded data, ER Mapper ERS format
grids_geosoft	contractor and DGGS	Geosoft-format grids, these grids can be viewed in ESRI ArcMap using a free plugin from Geosoft or the free viewer available from Geosoft
images_registered	DGGS	GeoTiff format images of all gridded data
kmz	DGGS	keyhole markup language (kml) kmz archive files of project data. Viewable in Google Earth and other compatible programs
maps_pdf_format	contractor and DGGS	Printable maps in pdf format
maps_prn_format	contractor	Printable maps in HPGL/2 printer file format with extension .prn
vector_data	contractor and DGGS	Line path, data contours, and survey boundary in ESRI shapefile (SHP) format, ESRI Geodatabase format, and/or AutoCAD dxf format

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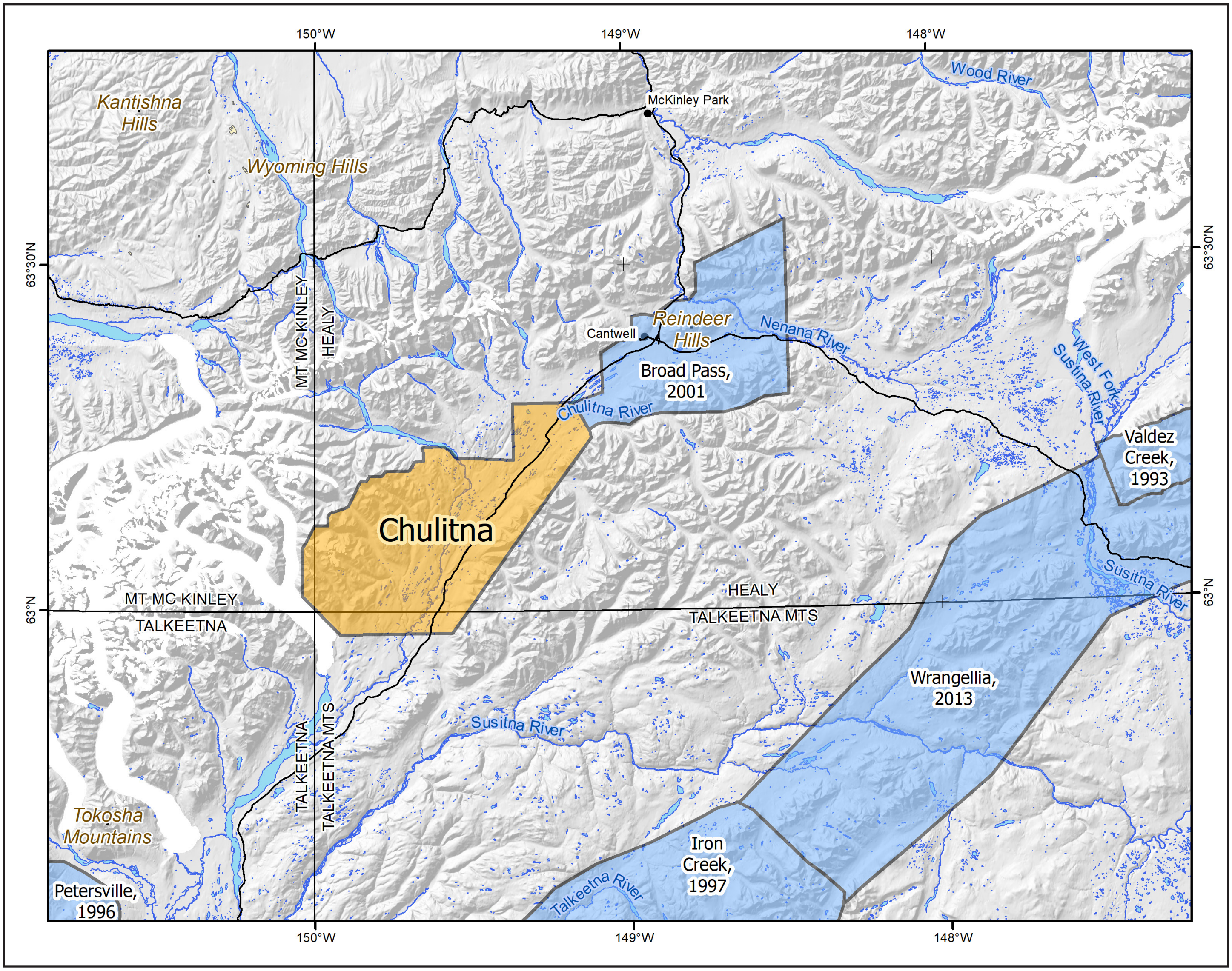


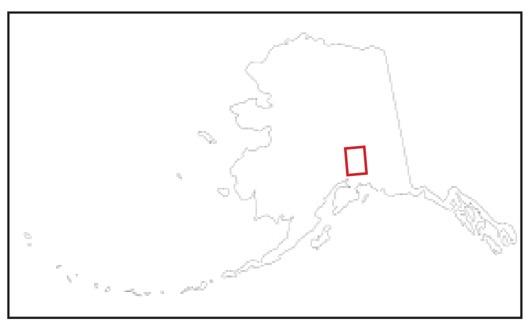


Figure 1. Chulitna electromagnetic and magnetic airborne geophysical survey location shown in interior Alaska (inset). Chulitna survey area shown with adjacent DGGS geophysical surveys, landmarks, relevant 1:250,000-scale quadrangle boundaries, mountain ranges, rivers, glaciers, and elevation hillshade.

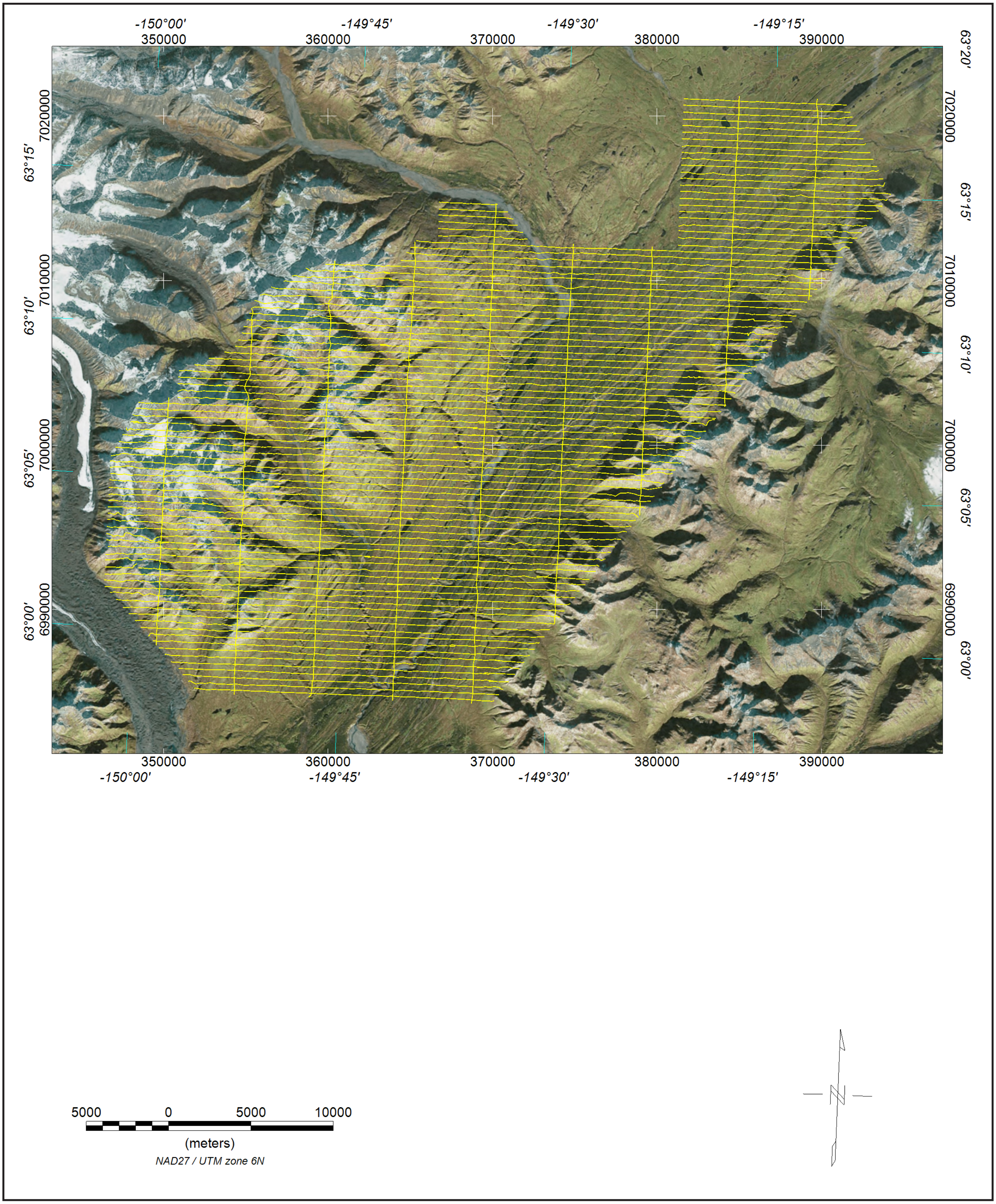


Figure 2. Flight path with orthometric image.

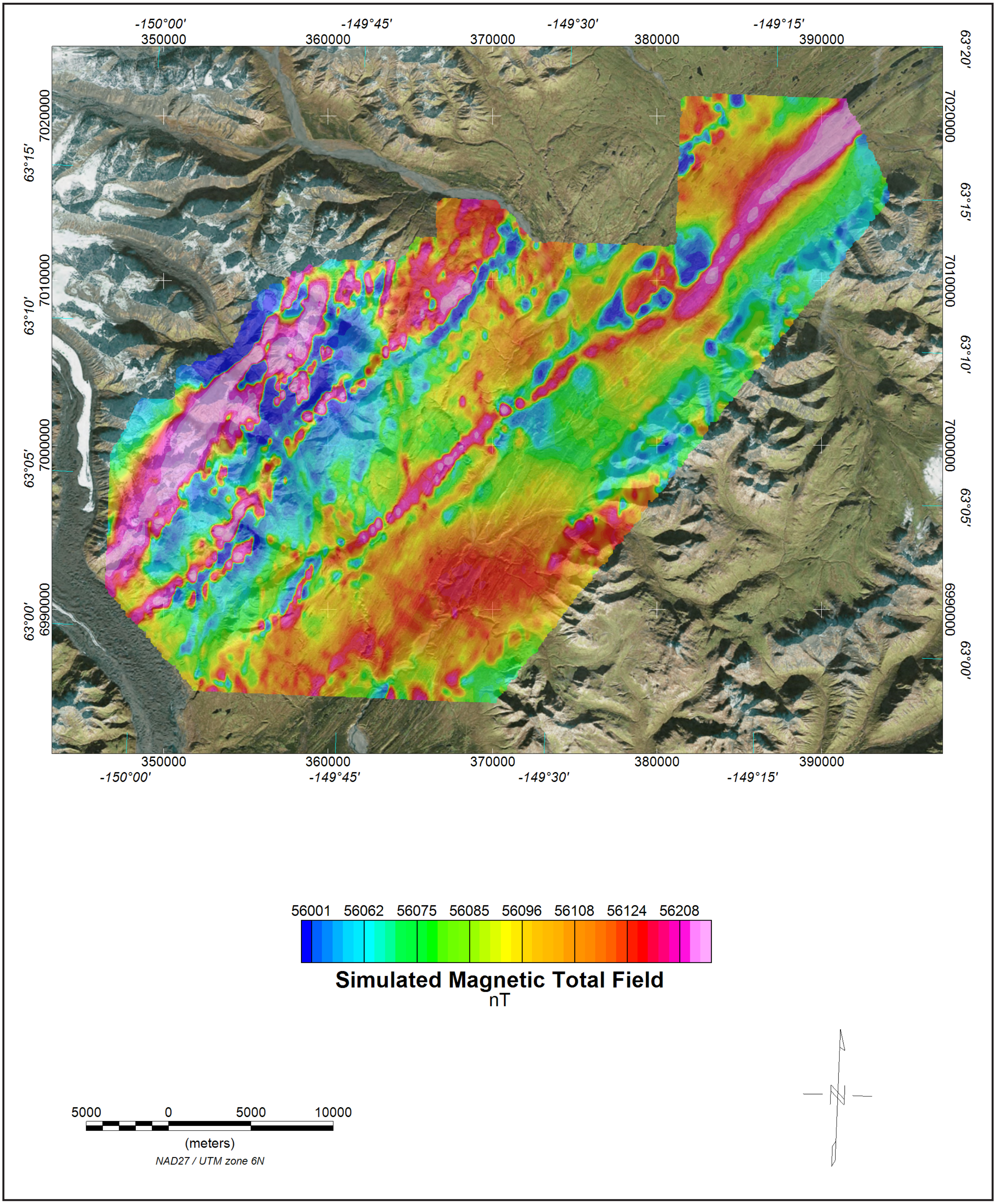


Figure 3. Simulated magnetic total field grid with orthometric image. The magnetic total field data were processed using digitally recorded data from a Picodas 3340 cesium magnetometer. Data were collected at a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtracting the digitally recorded base station magnetic data, (2) IGRF corrected (IGRF model 1985, updated to October, 1996), (3) leveled to the tie line data, (4) a constant value of approximately 56,000 nT was added to all data, and (5) interpolated onto a regular 100 m grid using a modified Akima (1970) technique.

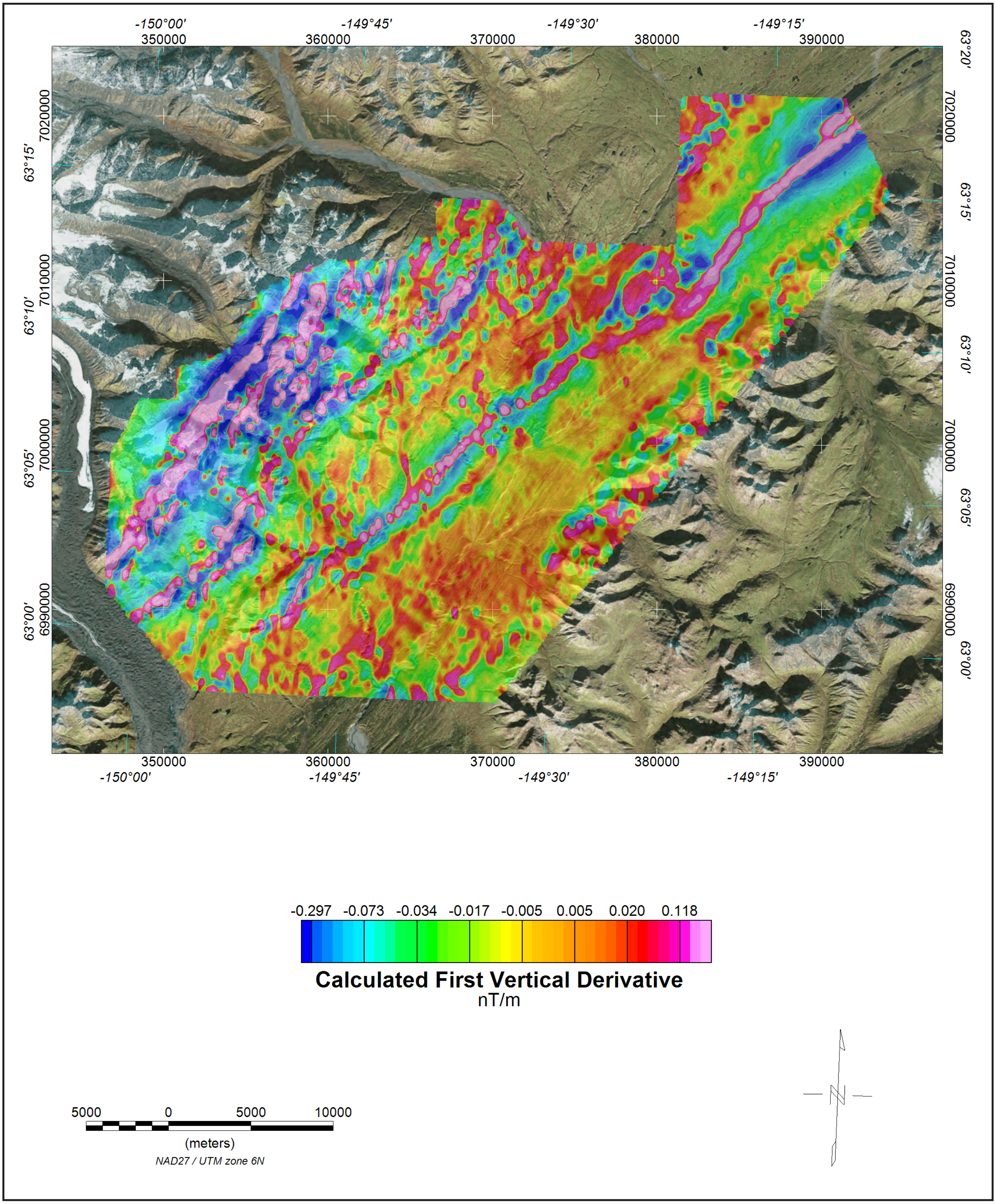


Figure 4. Calculated first vertical derivative grid with orthometric image. The first vertical derivative grid was calculated from the diurnally-corrected, IGRF-corrected total magnetic field grid using a FFT base frequency domain filtering algorithm. The resulting first vertical derivative grid provides better definition and resolution of near- surface magnetic units and helps to identify weak magnetic features that may not be evident on the total field data.

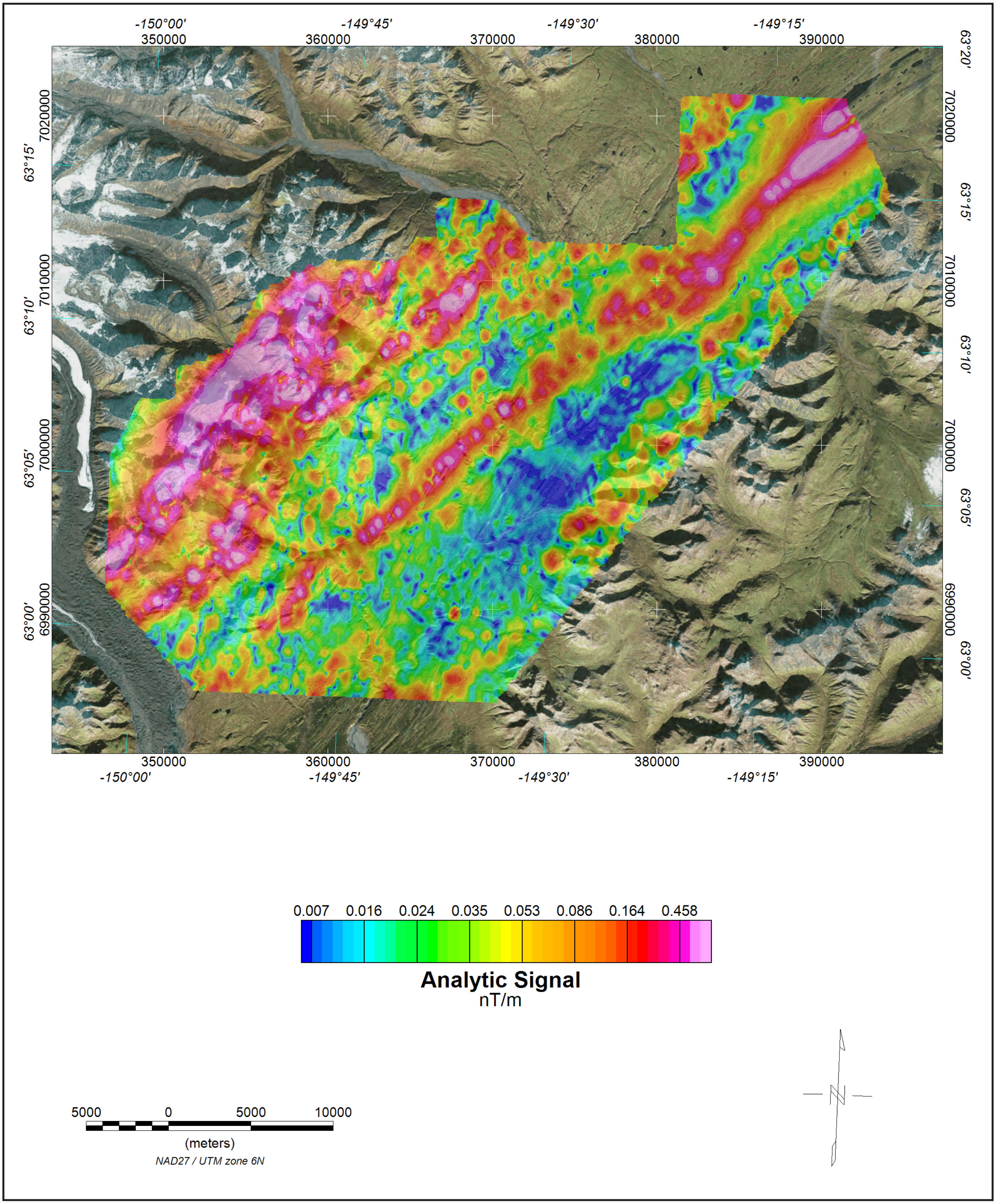


Figure 5. Analytic signal grid with orthometric image. Analytic signal is the total amplitude of all directions of magnetic gradient calculated from the sum of the squares of the three orthogonal gradients. Mapped highs in the calculated analytic signal of magnetic parameter locate the anomalous source body edges and corners (such as contacts, fault/shear zones, etc.). Analytic signal maxima are located directly over faults and contacts, regardless of structural dip, and independent of the direction of the induced and/or remanent magnetizations.

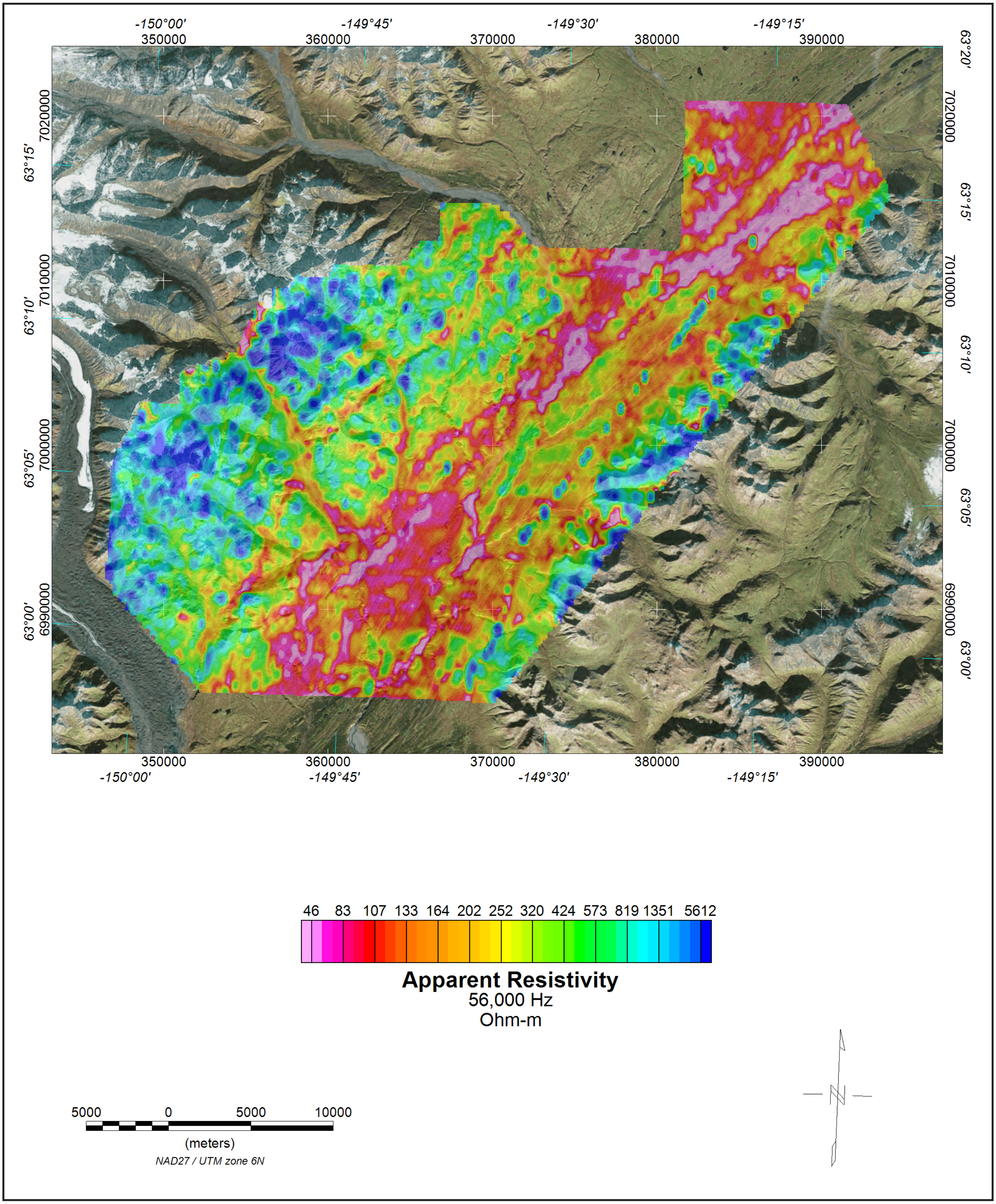


Figure 6. 56,000 Hz coplanar apparent resistivity grid with orthometric image. The DIGHEM[V] EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 900 and 5,000 Hz while three horizontal coplanar coil-pairs operated at 900, 7,200, and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 56,000 Hz using the pseudo-layer half space model. The data were interpolated onto a regular 100 m grid using a modified Akima (1970) technique.

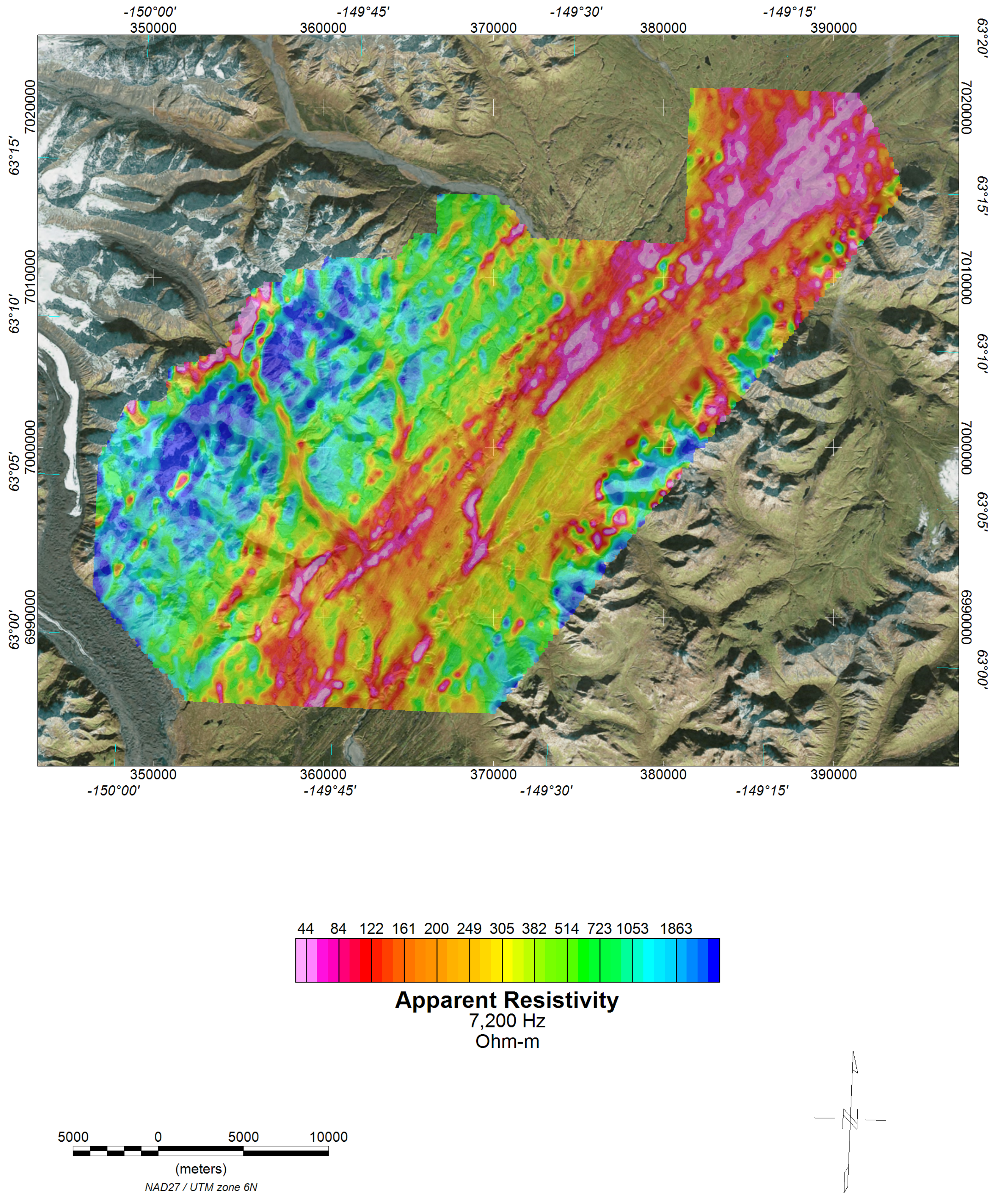


Figure 7. 7,200 Hz coplanar apparent resistivity grid with orthometric image. The DIGHEM[V] EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 900 and 5,000 Hz while three horizontal coplanar coil-pairs operated at 900, 7,200, and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 7,200 Hz using the pseudo-layer half space model. The data were interpolated onto a regular 100 m grid using a modified Akima (1970) technique.

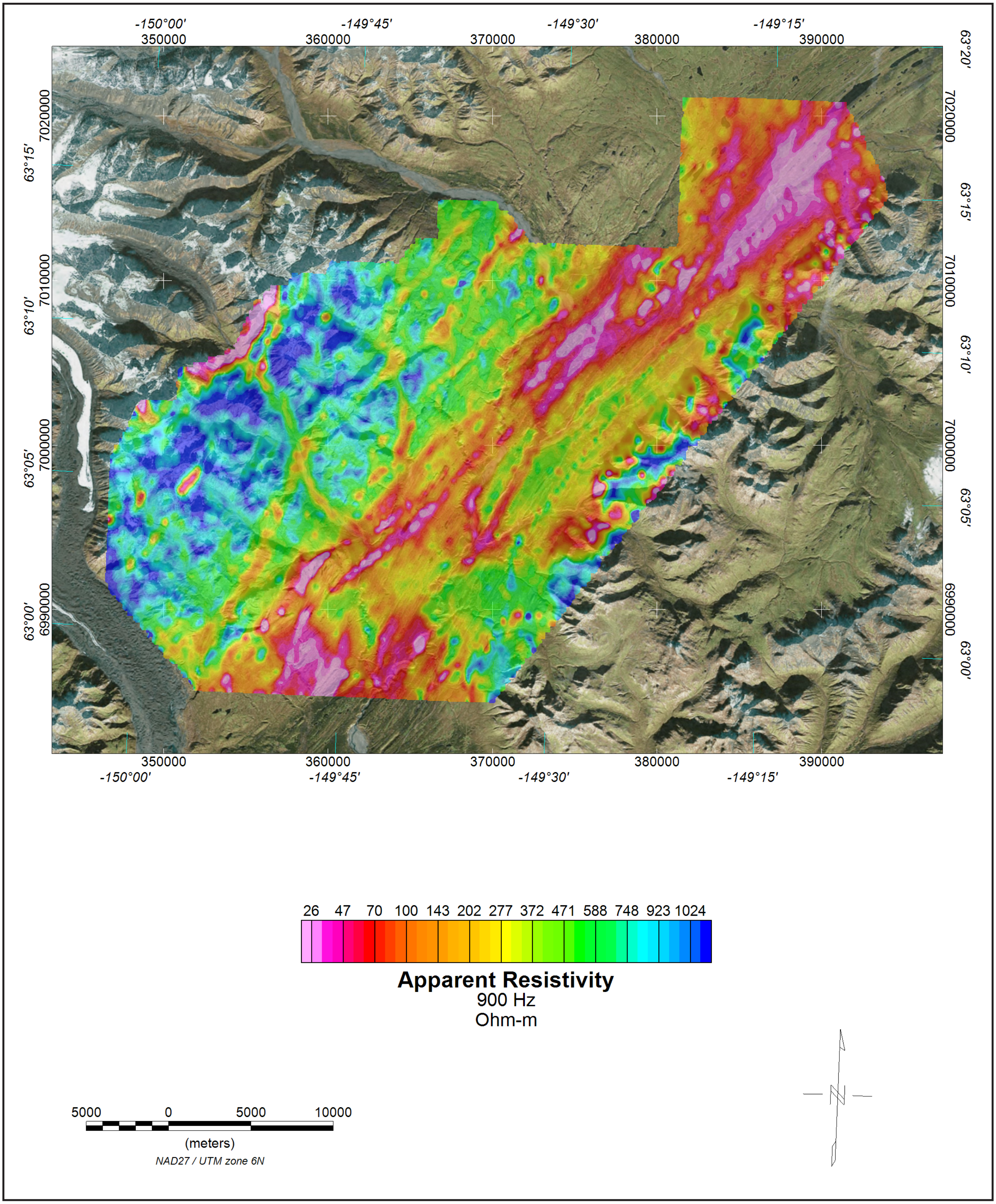
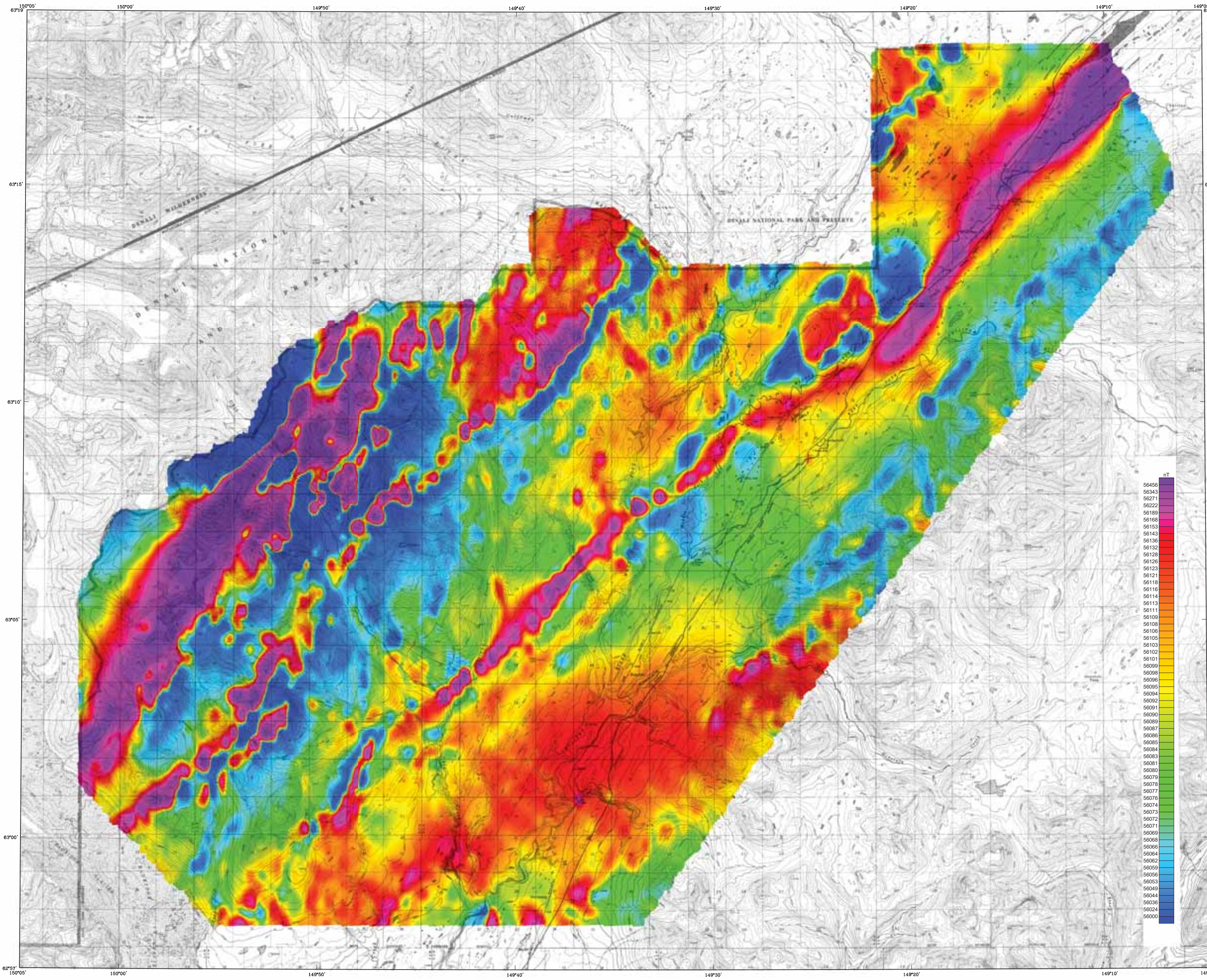


Figure 8. 900 Hz coplanar apparent resistivity grid with orthometric image. The DIGHEM[V] EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 900 and 5,000 Hz while three horizontal coplanar coil-pairs operated at 900, 7,200, and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 900 Hz using the pseudo-layer half space model. The data were interpolated onto a regular 100 m grid using a modified Akima (1970) technique.

Table 1. Copies of the following maps are included at the end of this booklet. The low-resolution, page-size maps included in this booklet are intended to be used as a search tool and are not the final product. Large-scale, full-resolution versions of each map are available to download on this publication's citation page: http://doi.org/10.14509/30416

Map Title	Description
chulitna_sim_magtf_topo_map.pdf	simulated magnetic total field grid with topographic base map
chulitna_sim_magtf_contours_plss_map.pdf	simulated magnetic total field grid with data contours and public land survey system base layer
chulitna_res7200hz_topo_map.pdf	7,200 Hz apparent resistivity grid with topographic base map
chulitna_res7200hz_contours_plss_map.pdf	7,200 Hz apparent resistivity grid with data contours and public land survey system base layer
chulitna_res900hz_topo_map.pdf	900 Hz apparent resistivity grid with topographic base map
chulitna_res900hz_contours_plss_map.pdf	900 Hz apparent resistivity grid with data contours and public land survey system base layer
chulitna_interpretation_plss_map.pdf	interpretation based on geophysical data with public land survey system base layer
chulitna_emanomalies_sim_magtf_contours_topo_map.pdf	electromagnetic anomaly map with simulated magnetic total field data contours and topographic base map
chulitna_emanomalies_sim_magtf_contours_detailed_topo_map_1of4.pdf	detailed electromagnetic anomaly map with simulated magnetic total field grid contours and topographic base map
chulitna_emanomalies_sim_magtf_contours_detailed_topo_map_2of4.pdf	detailed electromagnetic anomaly map with simulated magnetic total field grid contours and topographic base map
chulitna_emanomalies_sim_magtf_contours_detailed_topo_map_3of4.pdf	detailed electromagnetic anomaly map with simulated magnetic total field grid contours and topographic base map
chulitna_emanomalies_sim_magtf_contours_detailed_topo_map_4of4.pdf	detailed electromagnetic anomaly map with simulated magnetic total field grid contours and topographic base map

ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS **GEOPHYSICAL REPORT 2004_8_1a**



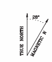
Base from U.S. Geological Survey Healy A-5, B-5, 1950; A-6, 1949; B-6, 1954; Mt McKinley A-1, 1954; B-1, 1995; Talkeetna D-1, 1958; Talkeetna Mts. D-5, 1950; D-6, 1951; Quadrangles, Alaska

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

CONTOUR INTERVAL 100 FEET
DATUM MEAN SEA LEVEL



APPROXIMATE MEAN DECLINATION, 1949

TOTAL MAGNETIC FIELD OF THE CHULITNA MINING DISTRICT, ALASKA

PARTS OF HEALY, MT.McKINLEY, TALKEETNA AND TALKEETNA MTS. QUADRANGLES

by
Laurel E. Burns, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.
2004

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM V Electromagnetic (EM) system, a Scintrex cesium CS2 magnetometer, and a Herz VLF system installed in an AS350B-1 Squirrel helicopter. In addition, the survey recorded data from a radar altimeter, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed at a mean terrain clearance of 200 feet along survey flight lines with a spacing of a quarter of a mile. Tie lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

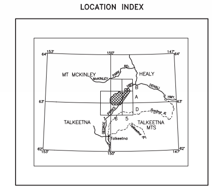
A Sercel Real-Time Differential Global Positioning System (RT-DGPS) was used for both navigation and flight path recovery. The helicopter position was derived every 0.5 seconds using real-time differential positioning to a relative accuracy of better than 10 m. Flight path positions were projected onto the Clark 1866 (UTM) spheroid, 1927 North American datum using a central meridian (CM) of 147°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

TOTAL MAGNETIC FIELD

The magnetic total field contours were produced using digitally recorded data from a Scintrex cesium CS2 magnetometer, with a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtraction of the digitally recorded base station magnetic data, (2) leveled to the tie line data, and (3) interpolated onto a regular 100 m grid using a modified Akima (1970) technique. The regional variation (or IGRF gradient, 1985, updated to October, 1996) was removed from the leveled magnetic data.

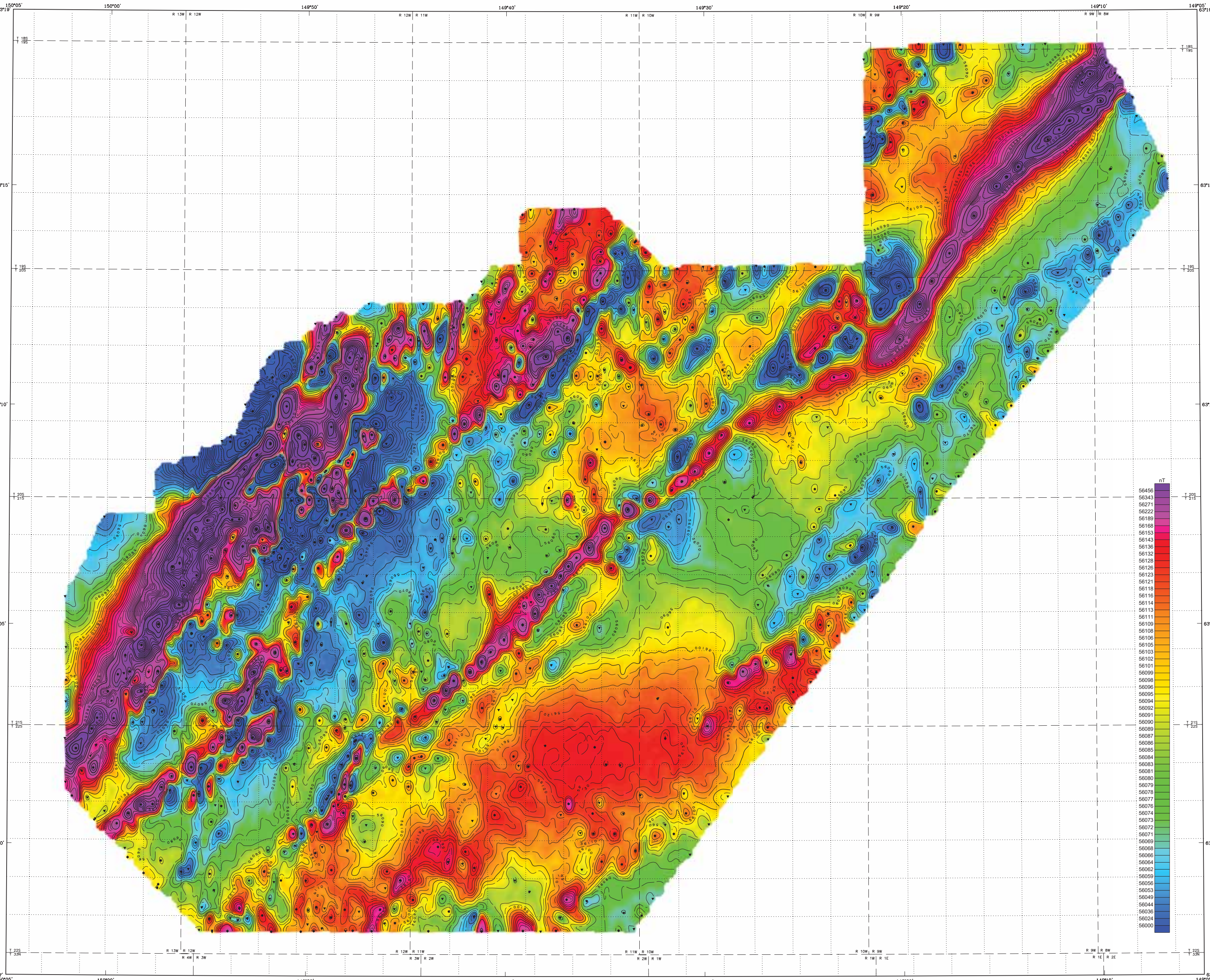
Akima, H., 1970, A new method of interpolation and smooth curve fitting based on local procedures: Journal of the Association of Computing Machinery, v. 17, no. 4, p. 589-602.

LOCATION INDEX

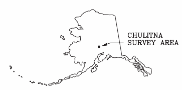


SURVEY HISTORY

The map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys, and Stevens Exploration Management Corp. The map was produced by Fugro Airborne Surveys and supercedes the earlier full color version released by DGGS in 1997. Airborne geophysical data for the area were acquired and processed in 1996 under contract between DGGS and WGM, Mining and Geological Consultants, Inc. The subcontractor acquiring and processing the data was DIGHEM, a division of CGG Canada Ltd. Other products from this survey are available from DGGS, 3354 College Road, Fairbanks, Alaska, 99709-3707.



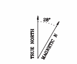
Section outlines from U.S. Geological Survey Healy A-5, B-5, 1950; A-6, 1949; B-6, 1954; Mt McKinley A-1, 1954; B-1, 1995; Talkeetna D-1, 1958; Talkeetna Mts. D-5, 1950; D-6, 1951; Quadrangles, Alaska



SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS



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MAGNETIC CONTOUR INTERVAL

250 nT

50 nT

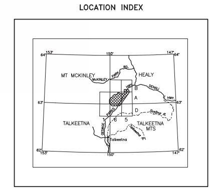
10 nT

5 nT

magnetic low

magnetic high

LOCATION INDEX



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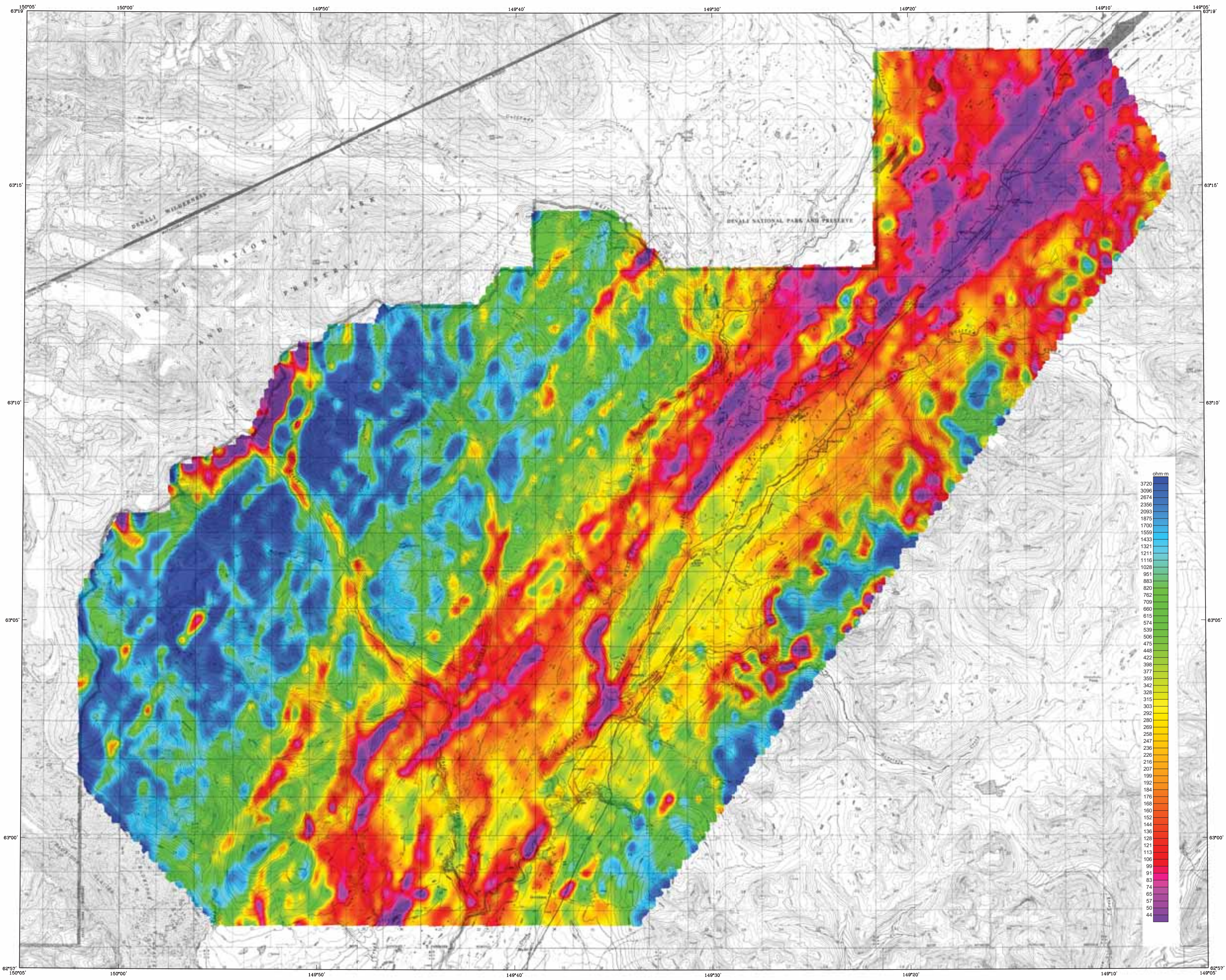
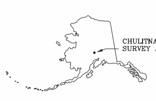


Base from U.S. Geological Survey Healy A-5, B-5, 1950; A-6, 1949; B-6, 1954; Mt McKinley A-1, 1954; B-1, 1995; Talkeetna D-1, 1958; Talkeetna Mts. D-5, 1950; D-6, 1951; Quadrangles, Alaska



SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

CONTOUR INTERVAL 100 FEET
DATUM MEAN SEA LEVEL

APPROXIMATE MEAN DECLINATION, 1949

7200 Hz COPLANAR APPARENT RESISTIVITY OF THE CHULITNA MINING DISTRICT, ALASKA

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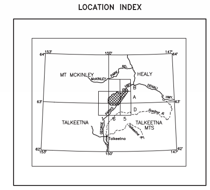
A Sercel Real-Time Differential Global Positioning System (RT-DGPS) was used for both navigation and flight path recovery. The helicopter position was derived every 0.5 seconds using real-time differential positioning to a relative accuracy of better than 10 m. Flight path positions were projected onto the Clark 1866 (UTM) spheroid, 1927 North American datum using a central meridian (CM) of 147°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

RESISTIVITY

The DIGHEM[V] EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 900 and 5000 Hz while three horizontal coplanar coil-pairs operated at 900, 7200 and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 7200 Hz using the pseudo-layer half space model. The data were interpolated onto a regular 100 m grid using a modified Akima (1970) technique.

Akima, H.,1970, A new method of interpolation and smooth curve fitting based on local procedures: Journal of the Association of Computing Machinery, v. 17, no.4, p.589-602.

LOCATION INDEX

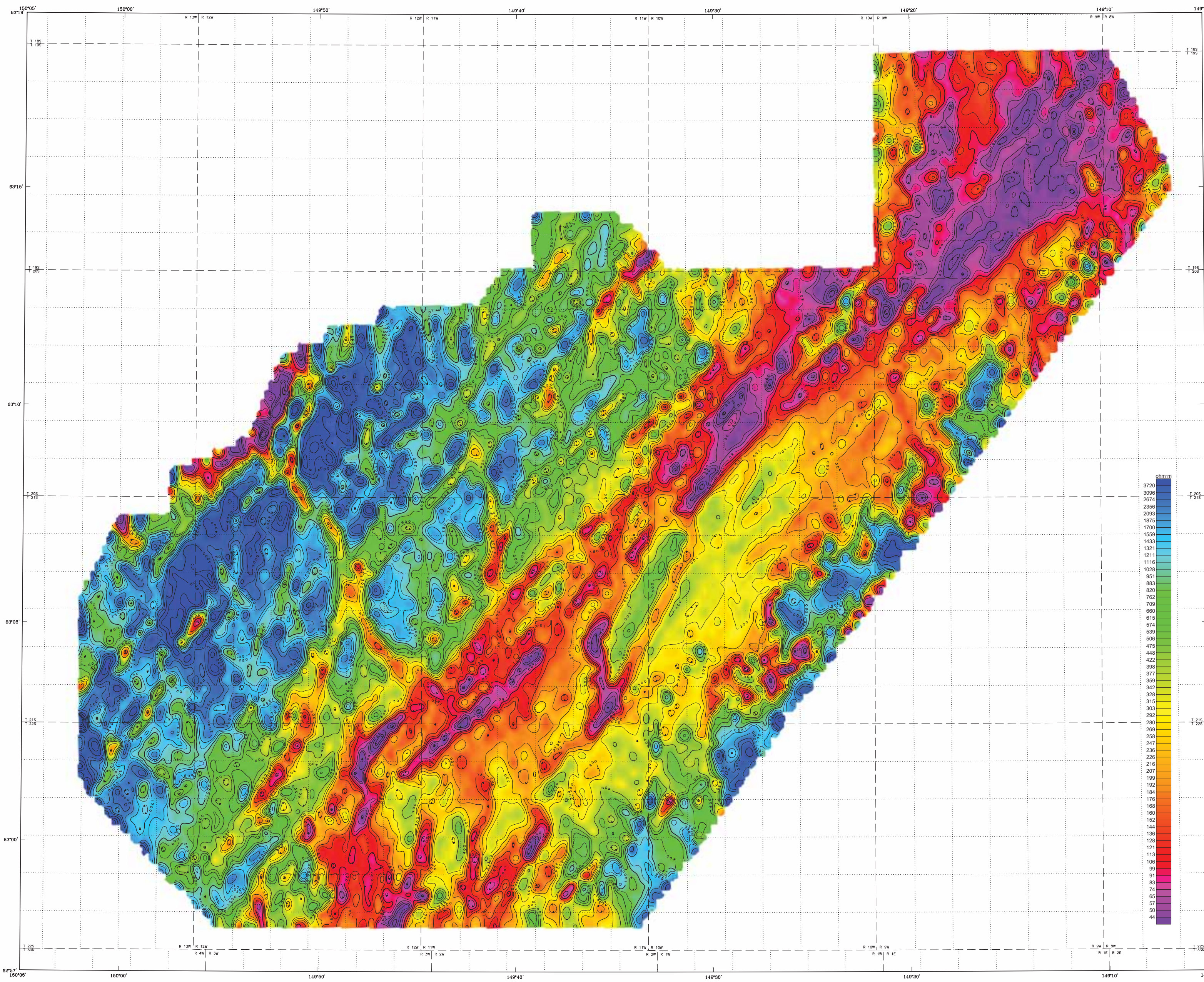


SURVEY HISTORY

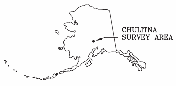
The map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys, and Stevens Exploration Management Corp. The map was produced by Fugro Airborne Surveys and supercedes the earlier full color version released by DGGS in 1997. Airborne geophysical data for the area were acquired and processed in 1996 under contract between DGGS and WGM, Mining and Geological Consultants, Inc. The subcontractor acquiring and processing the data was DIGHEM, a division of CGG Canada Ltd. Other products from this survey are available from DGGS, 3354 College Road, Fairbanks, Alaska, 99709-3707.

ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

GEOPHYSICAL REPORT 2004_8_2b



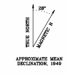
Section outlines from U.S. Geological Survey Healy A-5, B-5, 1950; A-6, 1949; B-6, 1954; Mt McKinley A-1, 1954; B-1, 1995; Talkeetna D-1, 1958; Talkeetna Mts. D-5, 1950; D-6, 1951; Quadrangles, Alaska



SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS



APPROXIMATE MEAN DECLINATION, 1949

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM V Electromagnetic (EM) system, a Scintrex cesium CS2 magnetometer, and a Herz VLF system installed in an AS350B-1 Squirrel helicopter. In addition, the survey recorded data from a radar altimeter, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed at a mean terrain clearance of 200 feet along survey flight lines with a spacing of a quarter of a mile. Tie lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

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RESISTIVITY

The DIGHEM V EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 900 and 5000 Hz while three horizontal coplanar coil-pairs operated at 900, 7200 and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 7200 Hz using the pseudo-layer half space model. The data were interpolated onto a regular 100 m grid using a modified Akima (1970) technique.

Akima, H.,1970, A new method of interpolation and smooth curve fitting based on local procedures: Journal of the Association of Computing Machinery, v. 17, no.4, p.589-602.

7200 Hz COPLANAR APPARENT RESISTIVITY OF THE CHULITNA MINING DISTRICT, ALASKA

PARTS OF HEALY, MT.McKINLEY, TALKEETNA AND TALKEETNA MTS. QUADRANGLES

by
Laurel E. Burns, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.
2004

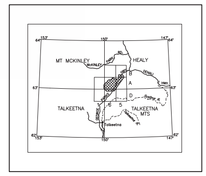
RESISTIVITY CONTOURS

1000
800
600
500
400
300
250
200
150
125
100

Contours in ohm-m at 10 intervals per decade

resistivity low

LOCATION INDEX



SURVEY HISTORY

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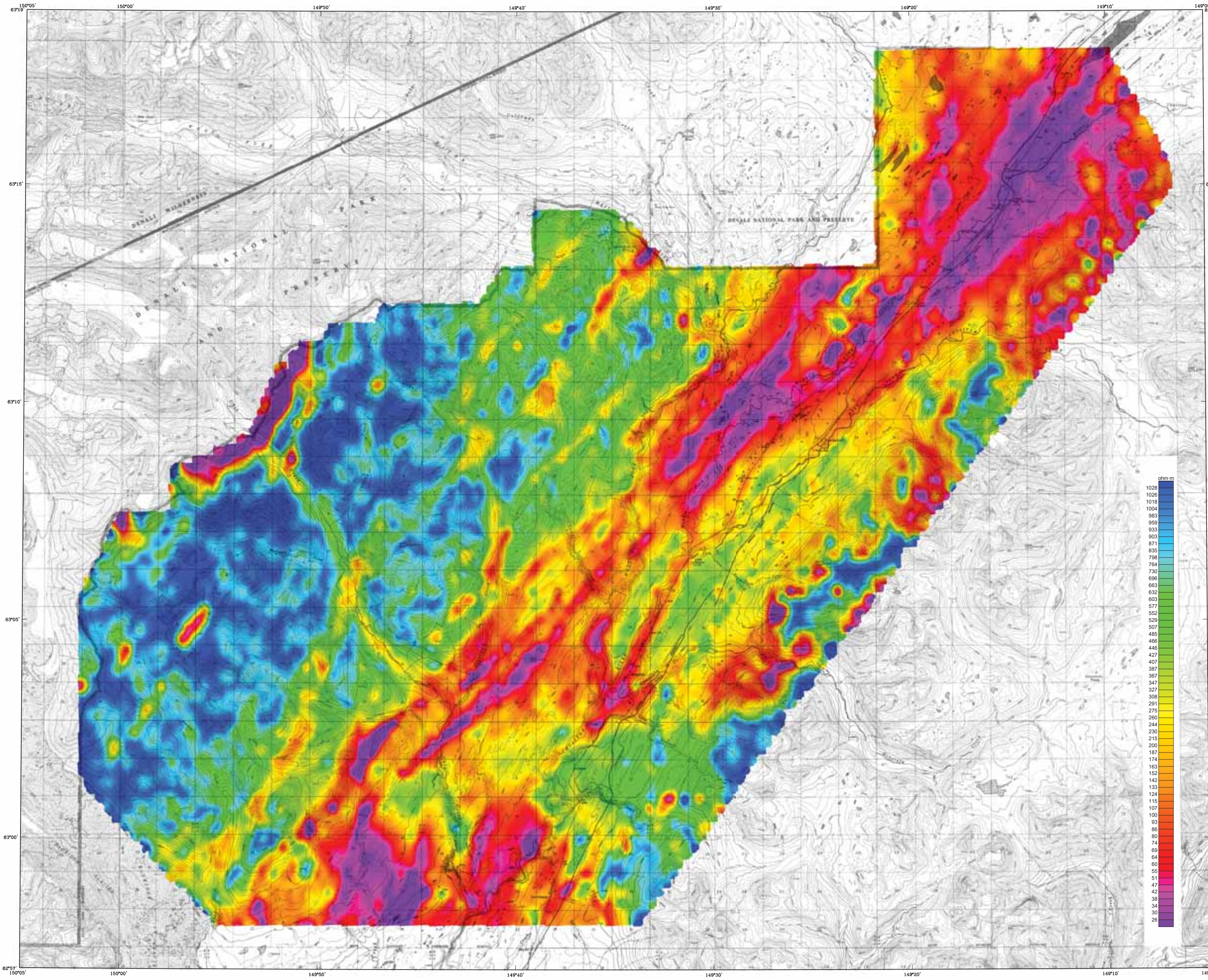
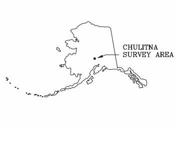
ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

GEOPHYSICAL REPORT 2004_8_3a



Base from U.S. Geological Survey Healy A-5, B-5, 1950; A-6, 1949; B-6, 1954; Mt McKinley A-1, 1954; B-1, 1995; Talkeetna D-1, 1958; Talkeetna Mts. D-5, 1950; D-6, 1951; Quadrangles, Alaska



SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

CONTOUR INTERVAL 100 FEET
DATUM MEAN SEA LEVEL

APPROXIMATE MEAN DECLINATION, 1948

900 Hz COPLANAR APPARENT RESISTIVITY OF THE CHULITNA MINING DISTRICT, ALASKA

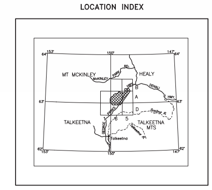
PARTS OF HEALY, MT.McKINLEY, TALKEETNA AND TALKEETNA MTS. QUADRANGLES

by

Laurel E. Burns, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.

2004

LOCATION INDEX



DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM V Electromagnetic (EM) system, a Scintrex cesium CS2 magnetometer, and a Herz VLF system installed in an AS350B-1 Squirrel helicopter. In addition, the survey recorded data from a radar altimeter, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed at a mean terrain clearance of 200 feet along survey flight lines with a spacing of a quarter of a mile. Tie lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

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RESISTIVITY

The DIGHEM V EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 900 and 5000 Hz while three horizontal coplanar coil-pairs operated at 900, 7200 and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 900 Hz using the pseudo-layer half space model. The data were interpolated onto a regular 100 m grid using a modified Akima (1970) technique.

Akima, H.,1970, A new method of interpolation and smooth curve fitting based on local procedures: Journal of the Association of Computing Machinery, v. 17, no.4, p.589-602.

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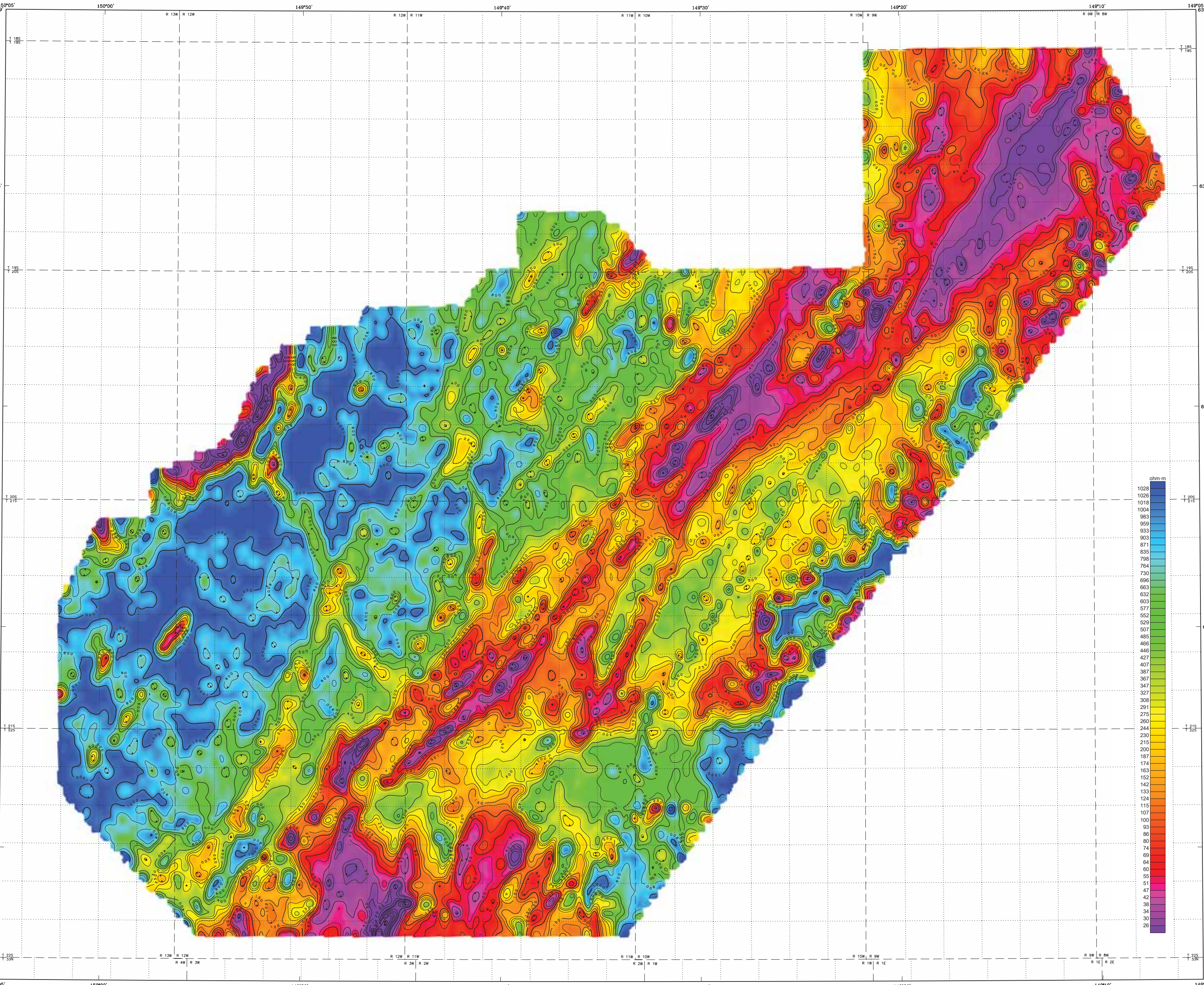
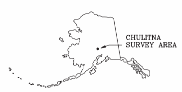


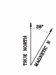
Section outlines from U.S. Geological Survey Healy A-5, B-5, 1950; A-6, 1949; B-6, 1954; Mt McKinley A-1, 1954; B-1, 1995; Talkeetna D-1, 1958; Talkeetna Mts. D-5, 1950; D-6, 1951; Quadrangles, Alaska



SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS



900 Hz COPLANAR APPARENT RESISTIVITY OF THE CHULITNA MINING DISTRICT, ALASKA

PARTS OF HEALY, MT.McKINLEY, TALKEETNA AND TALKEETNA MTS. QUADRANGLES

by
Laurel E. Burns, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.
2004

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM V Electromagnetic (EM) system, a Scintrex cesium CS2 magnetometer, and a Herz VLF system installed in an AS350B-1 Squirrel helicopter. In addition, the survey recorded data from a radar altimeter, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed at a mean terrain clearance of 200 feet along survey flight lines with a spacing of a quarter of a mile. Tie lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

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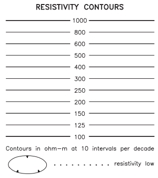
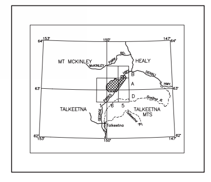
Akima, H.,1970, A new method of interpolation and smooth curve fitting based on local procedures: Journal of the Association of Computing Machinery, v. 17, no.4, p.589-602.

RESISTIVITY CONTOURS



Contours in ohm-m at 10 intervals per decade

LOCATION INDEX



SURVEY HISTORY

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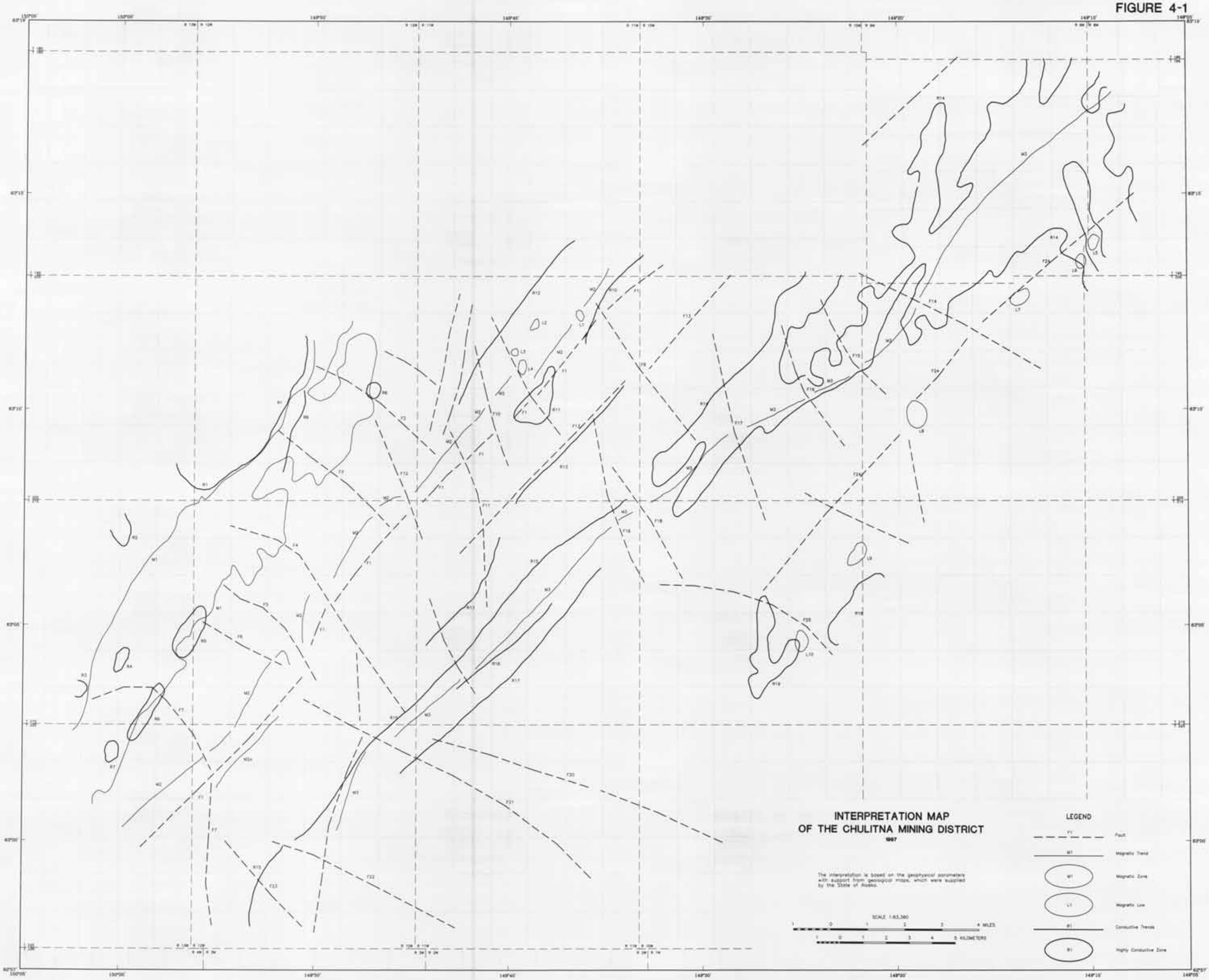
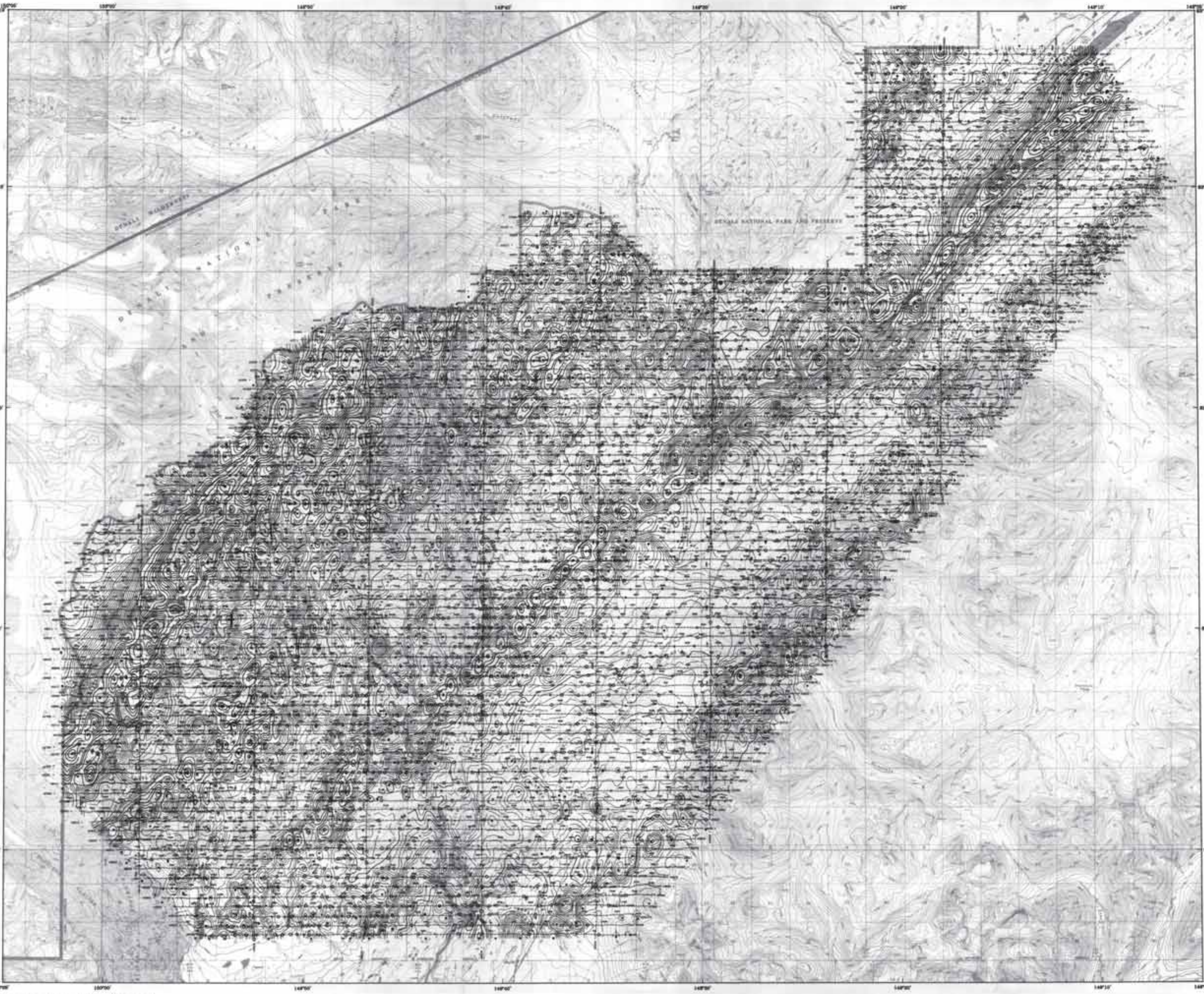
PUBLIC-DATA FILE 97-8
INTERPRETATION CHULITNA
FIGURE 4-1





TOTAL FIELD MAGNETICS AND ELECTROMAGNETIC ANOMALIES OF THE CHULITNA MINING DISTRICT, ALASKA

1997

IGRF GRADIENT REMOVED

SCALE 1:63,360

LOCATION INDEX

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM V Electromagnetic (EM) system, a Scintrex cesium CS2 magnetometer, and a Herz VLF system installed in an AS350B-1 Squirrel helicopter. In addition, the survey recorded data from a radar altimeter, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed at a mean terrain clearance of 200 feet along survey flight lines with a spacing of a quarter of a mile. Tie lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

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ELECTROMAGNETICS

To determine the location of EM anomalies or their boundaries, the DIGHEM[V] EM system measured inphase and quadrature components of five frequencies. Two vertical coaxial-coil pairs operated at 900 and 5000 Hz while three horizontal coplanar-coil pairs operated at 900, 7200, and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. The power line monitor and the flight track video were examined to locate cultural sources. The EM anomalies that are indicated are classified by conductance.

ELECTROMAGNETIC ANOMALIES

Anomaly	Conductance
●	>50 siemens
○	<50 siemens
●	Questionable anomaly
△	Weak conductivity associated with an EM magnetite response

MAGNETIC CONTOUR INTERVAL

———	250 nT
———	50 nT
———	10 nT
— — —	5 nT
⊙	magnetic low
⊙	magnetic high

SURVEY HISTORY

This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys, and WGM Inc., Mining and Geological Consultants. Airborne geophysical data for the area were acquired by DIGHEM, a division of CGG Canada Ltd., in 1996. Other products from this survey are available from the Alaska Division of Geological & Geophysical Surveys, 794 University Ave., Suite 200, Fairbanks, Alaska, 99709.

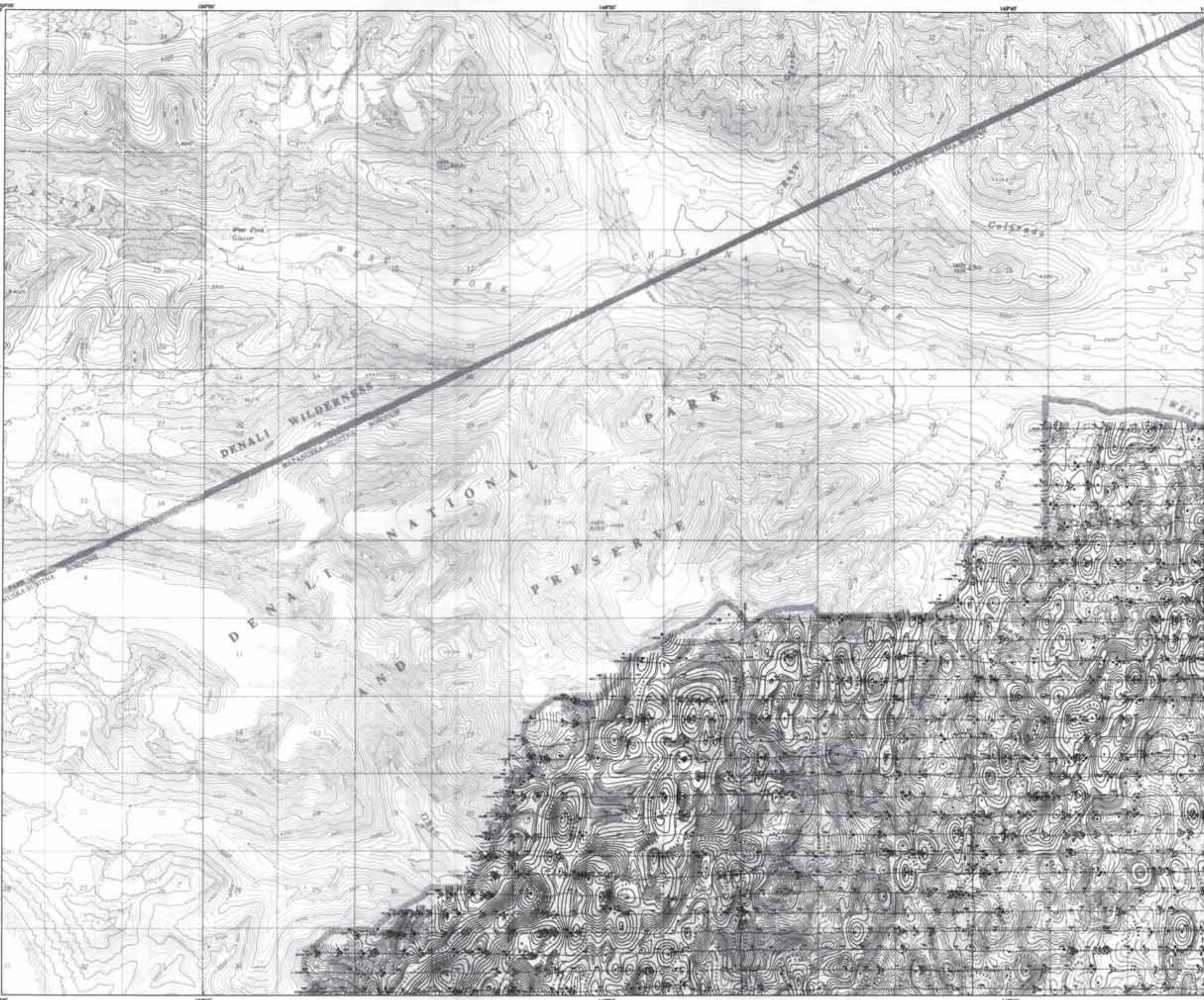
TOTAL FIELD MAGNETICS

The total field magnetic data were acquired with a sampling interval of 0.1 seconds, and were (1) corrected for diurnal variations by subtraction of the digitally recorded base station magnetic data, (2) leveled to the tie line data, and (3) interpolated onto a regular 100 m grid using a modified Akima (1970) technique. The regional variation (or IGRF gradient, 1985, updated to October 1996) was removed from the leveled magnetic data.

Akima, H.,1970, A new method of interpolation and smooth curve fitting based on local procedures: Journal of the Association of Computing Machinery, v. 17, no. 4, p. 589–602.

ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

PUBLIC-DATA FILE 97-26A
NORTHWEST CHULITNA



TOTAL FIELD MAGNETICS AND DETAILED ELECTROMAGNETIC ANOMALIES OF THE NORTHWEST CHULITNA MINING DISTRICT, ALASKA

1997

IGRF GRADIENT REMOVED

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM[V] Electromagnetic (EM) system, a Scintrex cesium CS2 magnetometer, and a Herz VLF system installed in an AS350B-1 Squirrel helicopter. In addition, the survey recorded data from a radar altimeter, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed at a mean terrain clearance of 200 feet along survey flight lines with a spacing of a quarter of a mile. Tie lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

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ELECTROMAGNETICS

To determine the location of EM anomalies or their boundaries, the DIGHEM[V] EM system measured inphase and quadrature components of five frequencies. Two vertical coaxial-coil pairs operated at 900 and 5000 Hz while three horizontal coplanar-coil pairs operated at 900, 7200, and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. The type of conductor is indicated on the aeromagnetic map by the interpretive symbol attached to each EM anomaly. Determination of the type of conductor is based on EM anomaly shapes of the coaxial- and coplanar-coil responses, together with conductor and magnetic patterns and topography. The power line monitor and the flight track video were examined to locate cultural sources.

ELECTROMAGNETIC ANOMALIES

Anomaly	Conductance
●	>100 siemens
●	50–100 siemens
●	20–50 siemens
●	10–20 siemens
●	5–10 siemens
○	1–5 siemens
○	<1 siemens
•	Questionable anomaly
△*	EM magnetite response

Interpretive symbol	Conductor ("mode")
B	Bedrock conductor
D	Narrow bedrock conductor ("thin dike")
S	Conductive cover ("horizontal thin sheet")
H	Broad conductive rock unit, deep conductive weathering, thick conductive cover ("half space")
E	Edge of broad conductor ("edge of half space")
L	Culture, e.g., power line, metal building or fence

Arcs indicate the conductor has a thickness >10m

Magnetic correlation in nT

Dip direction

Anomaly identifier

Interpretive symbol

Depth is greater than

15 m

30 m

45 m

60 m

Inphase and quadrature of coaxial coil is greater than

5 ppm

10 ppm

15 ppm

20 ppm

MAGNETIC CONTOUR INTERVAL

100 nT

20 nT

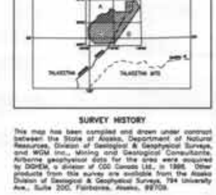
4 nT

2 nT

magnetic low

magnetic high

LOCATION INDEX FOR PDF 97-26 SHEETS A-D



SURVEY HISTORY

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TOTAL FIELD MAGNETICS

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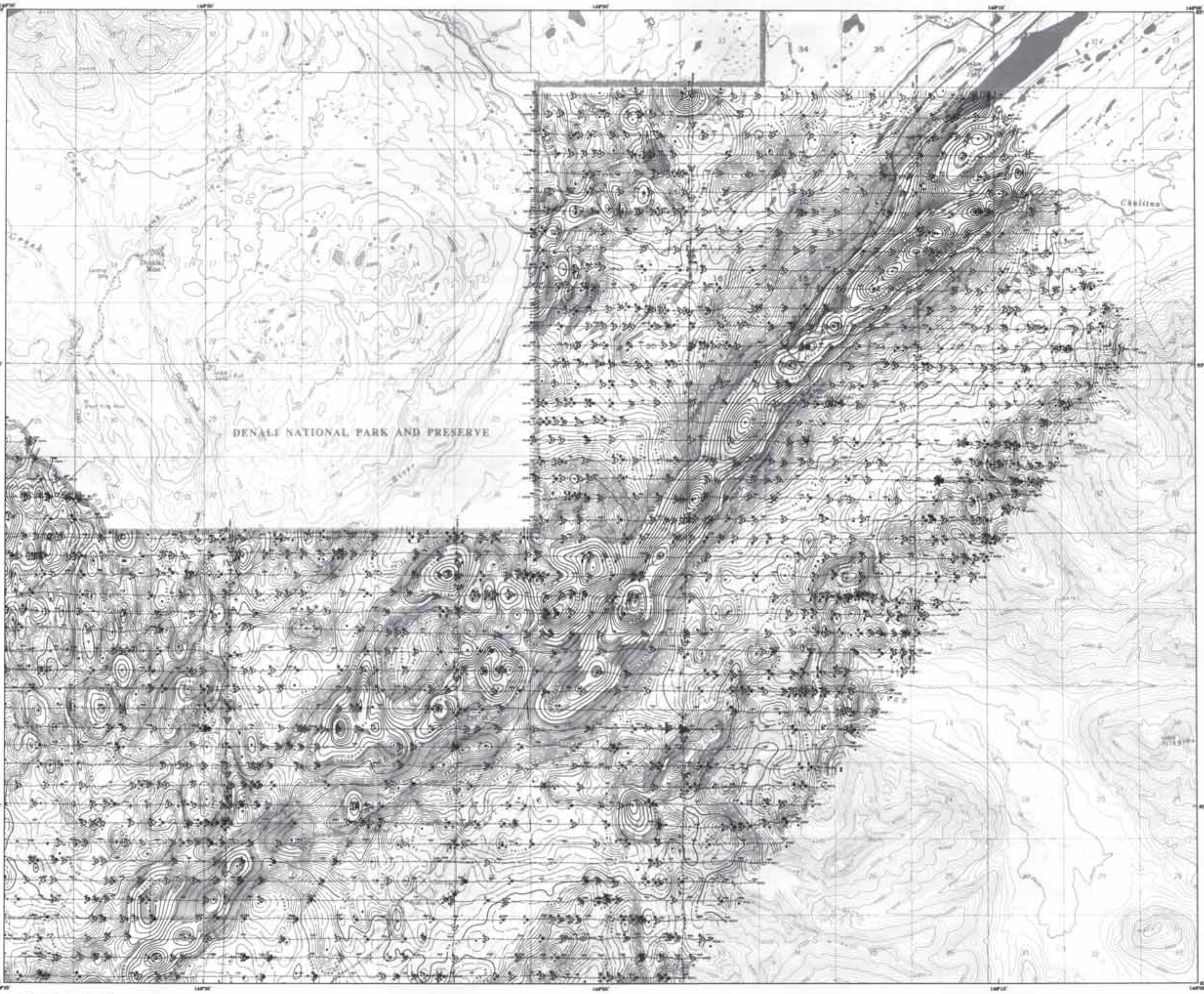
Akima, H., 1970, A new method of interpolation and smooth curve fitting based on local procedures: Journal of the Association of Computing Machinery, v. 17, no. 4, p. 589–602.

ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

PUBLIC-DATA FILE 97-26B
NORTHEAST CHULITNA



TOTAL FIELD MAGNETICS AND DETAILED ELECTROMAGNETIC ANOMALIES OF THE NORTHEAST CHULITNA MINING DISTRICT, ALASKA

1997

IGRF GRADIENT REMOVED

DESCRIPTIVE NOTES

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ELECTROMAGNETICS

To determine the location of EM anomalies or their boundaries, the DIGHEM EM system measured inphase and quadrature components of five frequencies. Two vertical coaxial-coil pairs operated at 900 and 5000 Hz while three horizontal coplanar-coil pairs operated at 900, 7200, and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. The type of conductor is indicated on the aeromagnetic map by the interpretive symbol attached to each EM anomaly. Determination of the type of conductor is based on EM anomaly shapes of the coaxial- and coplanar-coil responses, together with conductor and magnetic patterns and topography. The power line monitor and the flight track video were examined to locate cultural sources.

ELECTROMAGNETIC ANOMALIES

Arcs indicate the conductor has a thickness >10m

Magnetic correlation in nT

Dip direction

Anomaly identifier

Interpretive symbol

Depth is greater than
15 m
30 m
45 m
60 m

Inphase and quadrature of coaxial coil is greater than
5 ppm
10 ppm
15 ppm
20 ppm

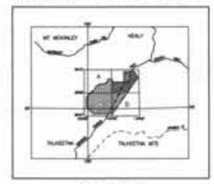
Anomaly	Conductance
	>100 siemens
	50–100 siemens
	20–50 siemens
	10–20 siemens
	5–10 siemens
	1–5 siemens
	<1 siemens
	Questionable anomaly
	EM magnetite response

Interpretive symbol	
	Conductor ("model")
B	Bedrock conductor
D	Narrow bedrock conductor ("thin dike")
S	Conductive cover ("horizontal thin sheet")
H	Broad conductive rock unit, deep conductive weathering, thick conductive cover ("half space")
E	Edge of broad conductor ("edge of half space")
L	Culture, e.g., power line, metal building or fence

MAGNETIC CONTOUR INTERVAL

100 nT
20 nT
4 nT
2 nT
magnetic low
magnetic high

LOCATION INDEX FOR PDF 97-26 SHEETS A-D



SURVEY HISTORY

This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys, and WGM Inc., Mining and Geological Consultants. Airborne geophysical data for the area were acquired by DIGHEM, a division of CGG Canada Ltd., in 1996. Other products from this survey are available from the Alaska Division of Geological & Geophysical Surveys, 794 University Ave., Suite 200, Fairbanks, Alaska, 99709.

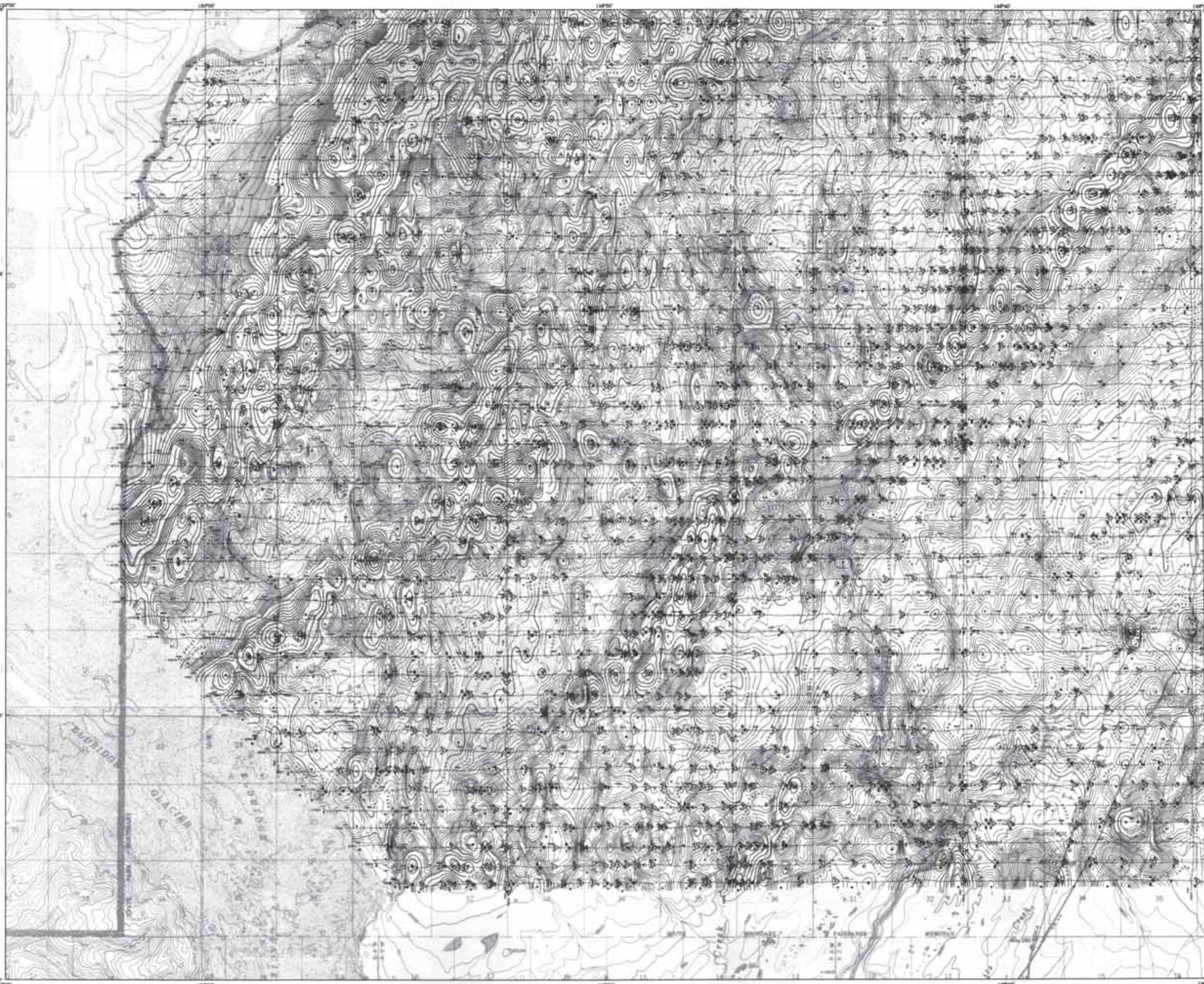
TOTAL FIELD MAGNETICS

The total field magnetic data were acquired with a sampling interval of 0.1 seconds, and were (1) corrected for diurnal variations by subtraction of the digitally recorded base station magnetic data, (2) leveled to the tie line data, and (3) interpolated onto a regular 100 m grid using a modified Akima (1970) technique. The regional variation (or IGRF gradient, 1985, updated to October 1996) was removed from the leveled magnetic data.

Akima, H.,1970, A new method of interpolation and smooth curve fitting based on local procedures: Journal of the Association of Computing Machinery, v. 17, no. 4, p. 589-602.

ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

PUBLIC-DATA FILE 97-26C
SOUTHWEST CHULITNA

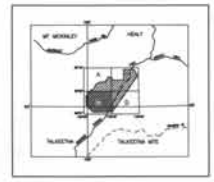


TOTAL FIELD MAGNETICS AND DETAILED ELECTROMAGNETIC ANOMALIES OF THE SOUTHWEST CHULITNA MINING DISTRICT, ALASKA

1997

IGRF GRADIENT REMOVED

LOCATION INDEX FOR PDF 97-26 SHEETS A-D



DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM® Electromagnetic (EM) system, a Scintrex cesium CS2 magnetometer, and a Herz VLF system installed in an AS350B-1 Squirrel helicopter. In addition, the survey recorded data from a radar altimeter, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed at a mean terrain clearance of 200 feet along survey flight lines with a spacing of a quarter of a mile. Tie lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

A Sercel Real-Time Differential Global Positioning System (RT-DGPS) was used for both navigation and flight path recovery. The helicopter position was derived every 0.5 seconds using real-time differential positioning to a relative accuracy of better than 10 m. Flight path positions were projected onto the Clark 1866 (UTM) spheroid, 1927 North American datum using a central meridian (CM) of 147°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

ELECTROMAGNETICS

To determine the location of EM anomalies or their boundaries, the DIGHEM® EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial-coil pairs operated at 900 and 5000 Hz while three horizontal coplanar-coil pairs operated at 900, 7200, and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. The type of conductor is indicated on the aeromagnetic map by the interpretive symbol attached to each EM anomaly. Determination of the type of conductor is based on EM anomaly shapes of the coaxial- and coplanar-coil responses, together with conductor and magnetic patterns and topography. The power line monitor and the flight track video were examined to locate cultural sources.

ELECTROMAGNETIC ANOMALIES

Area indicate the conductor has a thickness >10m
Magnetic correlation in nT
Dip direction

Anomaly identifier
Interpretive symbol
Depth is greater than
15 m
30 m
45 m
60 m
Inphase and quadrature of coaxial coil is greater than
5 ppm
10 ppm
15 ppm
20 ppm

Anomaly	Conductance
	>100 siemens
	50-100 siemens
	20-50 siemens
	10-20 siemens
	5-10 siemens
	1-5 siemens
	<1 siemens
	Questionable anomaly
	EM magnetite response

Interpretive symbol	Conductor ("model")
B	Bedrock conductor
D	Narrow bedrock conductor ("thin dike")
S	Conductive cover ("horizontal thin sheet")
H	Broad conductive rock unit, deep conductive weathering, thick conductive cover ("half space")
E	Edge of broad conductor ("edge of half space")
L	Culture, e.g., power line, metal building or fence

MAGNETIC CONTOUR INTERVAL

	100 nT
	20 nT
	4 nT
	2 nT
	magnetic low
	magnetic high

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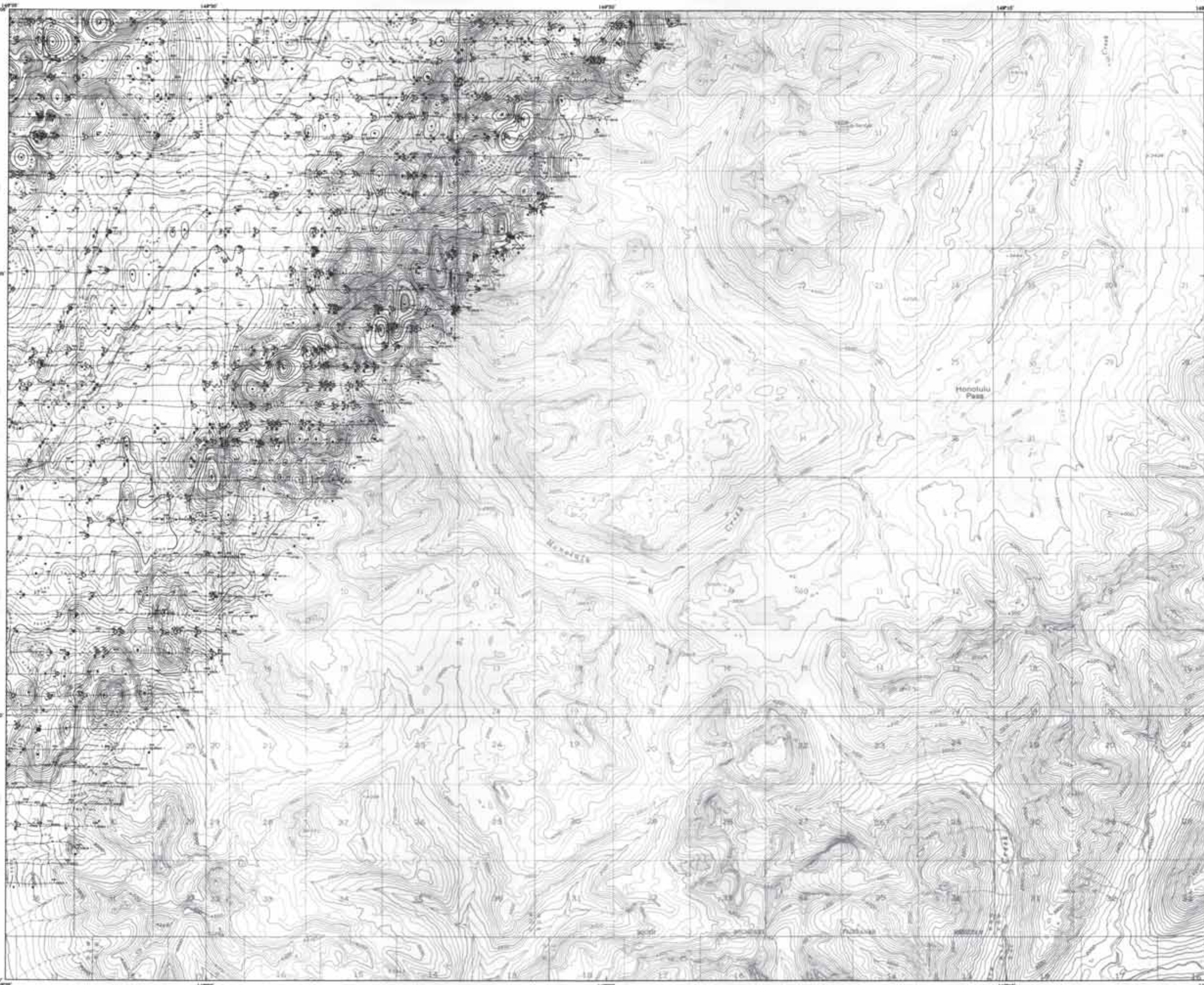


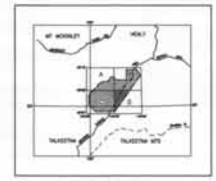
SCALE 1:31,680

TOTAL FIELD MAGNETICS AND DETAILED ELECTROMAGNETIC ANOMALIES OF THE SOUTHEAST CHULITNA MINING DISTRICT, ALASKA

1997

IGRF GRADIENT REMOVED

LOCATION INDEX FOR PDF 97-26 SHEETS A-D



DESCRIPTIVE NOTES

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Arrow indicate the conductor has a thickness >10m

Magnetic correlation in nT

Dip direction

Anomaly	Conductance
●	>100 siemens
●	50–100 siemens
●	20–50 siemens
●	10–20 siemens
⊕	5–10 siemens
○	1–5 siemens
○	<1 siemens
✱	Questionable anomaly
△	EM magnetite response

Anomaly identifier

Interpretive symbol

Depth is greater than: 15 m, 30 m, 45 m, 60 m

Inphase and quadrature of coaxial coil is greater than: 5 ppm, 10 ppm, 15 ppm, 20 ppm

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20 nT

4 nT

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magnetic low

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